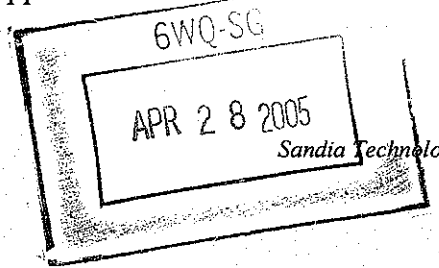
EXECUTIVE SUMMARY

Under the Hazardous Waste Disposal Injection Restrictions regulations promulgated by the Environmental Protection Agency (EPA), 40 CFR Part 148, 53 Fed. Reg. 28117 (July 26, 1988), the continued injection of any waste identified as a "hazardous waste" under EPA's Resource Conservation and Recovery Act (RCRA) regulations would be prohibited unless the waste meets an EPA-specified treatment standard or EPA approves a petition demonstrating, to a reasonable degree of certainty, that continued waste injection will be protective of human health and the environment for as long as the waste remains hazardous. Subsection 148.20(a)(1)(i) of the regulations provides that such a demonstration may be made on the basis of a scientific analysis showing that the injected fluids will not migrate vertically upward out of the injection zone or laterally within the injection zone to a point of discharge or interface with an Underground Source of Drinking Water (USDW) within 10,000 years.

Lyondell Chemical Company, Channelview Plant submitted a Hazardous Waste Disposal Injection Restrictions (HWDIR) Exemption Petition for its two on-site deepwells to EPA on November 18, 1988. This HWDIR Exemption Petition was approved on June 29, 1990. Lyondell Chemical Company, Channelview Plant submitted a HWDIR Exemption Petition Reissuance to EPA on March 14, 1991, requesting several modifications to the June 29, 1990, HWDIR Exemption Petition approval. This 1991 HWDIR Exemption Petition Reissuance was approved on March 24, 1992. A second HWDIR Exemption Petition Reissuance request was submitted by the Lyondell Chemical Company, Channelview Plant to EPA on April 22, 1993, requesting several additional modifications to both the June 29, 1990 HWDIR Exemption Petition and the March 24, 1992 HWDIR Exemption Petition Reissuance. This second reissuance request (1993 HWDIR Exemption Petition Reissuance) was approved on April 22, 1994.

Subsequent to approval of the 1993 Exemption Petition Reissuance, Lyondell Chemical Company evaluated its day-to-day operations of Plant Well 1 (WDW-148) and Plant Well 2 (WDW-162). The wells were limited to both an individual daily volume limit and an individual injection rate maximum, in each of the injection interval sands. On July 21, 2003, Lyondell Chemical Company, Channelview Plant requested a nonsubstantive revision to Approval Condition No. 2, requesting a monthly volume limit for each of the wells. This request was consistent with the modeling presented in the approved 1993 HWDIR Exemption Petition Reissuance (was approved on April 22, 1994). EPA approved this nonsubstantive revision on July 20, 3003 (see Appendix 1-2).



The two injection wells are currently limited by Petition Approval Condition No. 2 to an individual monthly volume in each injection interval calculated by multiplying the injection rate (85 gpm in the Frio D Sand, 290 gpm in the Frio E&F Sand, and 350 gpm in the Frio A/B/C Sand) times the minutes in a day (1,440 minutes) times the number of days in the month. On average, the current cumulative injection well feed at the plant typically ranges between 400 and 425 gpm. Therefore, it is possible that monthly effluent flow to a single well could exceed the volume limitation, if one of the wells is inoperative for an extended time period. This is especially true, now that both wells are completed into the Frio E&F Sand Injection Interval, which has a lower cumulative limit than the formerly used Commingled Frio A/B/C Sand Injection Interval. In the event of a future need to shut down and cease injection into one of the plant injection wells over a short-term basis (due to possible remedial operations or annual testing operations), it is very likely that plant operations would be impacted under the current Petition Approval Conditions. Therefore, Lyondell Chemical Company, Channelview Plant is requesting that Petition Approval Condition No. 2 be modified to specify injection limitations on a "per injection interval" basis as opposed to the current "by well" basis. Lyondell recommends that Petition Approval Condition No. 2 be modified to read as follows:

> "The injection volume injected into each injection interval during any given month shall not exceed that calculated by multiplying (the injection rate, gpm)(60 mimutes per hour)(24 hours per day)(the number of days in that month). The appropriate maximum injection rate for each injection interval should be determined from the following table:

Injection Interval	**Injection Rate**
Frio D Sand	425 gpm
Frio E&F Sand	700 gpm
Frio A/B/C Sand	700 gpm

In support of this request, operational sensitivity modeling is included in this 2000 HWDIR Exemption Petition Reissuance request. In the revised model simulations, a maximum rate of 700 gpm (on an annual basis) is modeled into the Frio E&F Sand Injection Interval at each well location for the entire duration of the projected operational period (from the start of 2002 to year-end 2020). Additionally, a maximum rate of 425 gpm (on an annual basis) is modeled into the Frio D Sand Injection Interval at each well location and a maximum rate of 700 gpm (on an annual basis) is modeled into the Commingled Frio A/B/C Sand Injection Interval at each well

location. These model sensitivity cases are obviously a "worst-case" assumption, since it is very likely that any well would be inoperative for only a short-term duration, only (i.e., measured in weeks to months). The modeling demonstrates that injection into the Frio E&F Sand Injection Interval, the Commingled Frio A/B/C Sand Injection Interval, or the Frio D Sand Injection Interval under these modified conditions will, to a reasonable degree of certainty, be protective of human health and the environment for as long as the waste remains hazardous. Note that Lyondell has included a flow monitoring protocol in Section 1.8.4, should one or both of the wells be completed into more than one injection interval at some point in the future.

Additionally, Lyondell Chemical Company, Channelview Plant is requesting that Petition Approval Condition No. 2 be modified to specify a site cumulative injection limitation for all of the injection intervals. Lyondell recommends that Petition Approval Condition No. 2 be further modified to read as follows:

> "The site cumulative injection volume injected into all injection intervals during any given month shall not exceed that calculated by multiplying (the injection rate of 700 gpm)(60 mimutes per hour)(24 hours per day)(the number of days in that month).

In this 2000 HWDIR Exemption Petition Reissuance, Lyondell Chemical Company is also requesting several additional modifications to the approval conditions of the 1993 HWDIR Exemption Petition Reissuance. The requested modifications fall into the following specific areas:

1) As a Petition Approval Condition (No. 1), the approval for injection is limited to an Injection Interval ranging in depth from 6,500 feet to 7,200 feet within an Injection Zone ranging in depth from 5,155 feet to 7,200 feet. To ensure compliance with the regulatory definitions and in order to provide a better match to the well log data for the injection wells, Lyondell Chemical Company is requesting minor modification to the regulatory depths, as follows (note depths are referenced to open-hole well logs):

Plant Well 1 (WDW-148)

	Name	Interval
Name and depth of Confining Zone:	Anahuac Formation	4,750 - 5,150 feet
Name and depth of Injection Zone:	Frio & Vicksburg Fms	5,150 - 7,350 feet

Name and depth of Injection Intervals:	Lower Frio Formation	6,500 - 7,277 feet
	Commingled Frio A/B/C Sand	6,884 - 7,277 feet
	Frio E&F Sand	6,630 - 6,874 feet
	Frio D Sand	6,502 - 6,624 feet

Plant Well 2 (WDW-162)

	Name	Interval
Name and depth of Confining Zone:	Anahuac Formation	4,750 - 5,150 feet
Name and depth of Injection Zone:	Frio & Vicksburg Fms	5,150 - 7,350 feet
Name and depth of Injection Interval:	Lower Frio Formation	6,500 - 7,270 feet
	Commingled Frio A/B/C Sand	6,878 - 7,270 feet
	Frio E&F Sand	6,625 - 6,858 feet
	Frio D Sand	6,506 - 6,616 feet

These changes are consistent to ensure that the defined Injection Zone extends deeper than the total drilled depth of the sidetrack in Plant Well 1 (WDW-148), which was drilled to 7,300 feet, and that the entire Frio C Sand is contained within the defined Injection Interval for each well.

2) As a Petition Approval Condition (No. 3), injection shall cease by December 31, 2010. Lyondell Chemical Company is requesting that the duration of the exemption be extended to December 31, 2020. In support of this change, an extended operational injection period is considered in the projected modeling and the increased volume associated with the longer duration is considered in the long-term models prepared for this 2000 HWDIR Exemption Petition Reissuance request.

3) As a Petition Approval Condition (No. 4), the characteristics of the injected waste stream shall at all times conform to those depicted in Appendix 1-1 (Waste Stream Composition) of the approved 1994 HWDIR Exemption Petition Reissuance.

Lyondell Chemical Company is requesting an expansion in concentration ranges for several of waste stream constituents. The requested increases are for protective purposes only, and are not a result of any increase in the compounds going down the wells. However, these changes fall within the bounds of the previously approved limiting concentration reduction factor of 1.0E-6. Information in support of this change, as per Approval Condition No. 6, is included in this 2000 HWDIR Exemption Petition Reissuance Request.

Additionally, Lyondell Chemical Company is requesting that the specified inclusive specific gravity range from 1.0 to 1.09 at 60 °F be modified to a three-whole calendar month volume weighted specific gravity average range of **1.028** to **1.100** at 60 °F. EPA rightly concluded on July 19, 1995 (letter from Mr. Myron Knudson, Director Water Management Division to Mr. Mark Cheesman UIC Subcommittee Chair - Texas Chemical Council), that a three-whole month volume weighted average injectate density is appropriate for facilities that do not inject "a significant amount of immiscible fluids." The Channelview Plant meets this criterion, as the injected stream is mostly water with minor quantities of miscible organics (i.e., no free phase organics). Therefore, a "three-whole month volume weighted specific gravity range" is appropriate for the Channelview Plant. Historical data is presented in this reissuance to support our ability to comply with the requested range. This change will simplify future compliance monitoring for this condition.

4) As a Petition Approval Condition (No. 5), the approval for injection is limited to the following waste codes: D001 (Ignitable), D002 (Corrosivity), D003 (Reactivity), D018 (Benzene), D035 (Methyl Ethyl Ketone), F005 (Toluene), P005 (Allyl Alcohol), U002 (Acetone), U019 (Benzene), U115 (Ethylene Oxide), U154 (Methanol), U159 (Methyl Ethyl Ketone), and U220 (Toluene). Lyondell Chemical Company requests that additional EPA Waste Codes be added to Petition Reissuance Condition No. 5 for protective purposes. These additional requested codes are: D004 (Arsenic), D005 (Barium), D006 (Cadmium), D007 (Chromium), D008 (Lead), D009 (Mercury), D010 (Selenium), D011 (Silver), D022 (Chloroform), D026 (total Cresols), D028 (Ethylene Dichloride), F003 (spent Ethyl benzene and Methanol solvent), F005 (spent Acetone and Ethyl benzene solvent), F039 (multi-source leachate), P003 (Acrolein), P013 (Barium), P047 (4,6-dinitro-o-cresol and salts), P065 (Mercury), P073 (Nickel), P074 (Nickel), P092 (Mercury), P099 (Silver), P103 (Selenium), P104 (Silver), P113 (Thallium), P114 (Selenium), P115 (Thallium), P119

and P120 (Vanadium), U001 (Acetaldehyde), U004 (Acetophenone), U031 (n-Butyl alcohol), U032 (Chromium), U051 (Xylene), U052 (Cresol, general), U055 (Cumene), U074 (Cis-1,4-dichloro-2-butene), U075 (Dichlorodifluoromethane), U077 (Ethylene dichloride), U136 (Arsenic), U140 (Isobutanol), U151 (Mercury), U165 (Napthelene), U188 (Phenol), U204 and U205 (Selenium), U213 (Tetrahydrofuran), U214 through U217 (Thallium), U226 (1,1,1 Trichloroethane), and U239 (Xylene). Information in support of these changes, as per Petition Reissuance Condition No. 6, is included in this 2000 HWDIR Exemption Petition Reissuance Request.

This 2000 HWDIR Exemption Petition Reissuance Request provides data and analysis sufficient under promulgated subsection 148.20(a)(1)(i) to demonstrate that continued injection of process wastewater, under the revised rate sensitivity modeling, the newly added protective constituent waste codes, and increased concentrations for several of the waste stream components, at the Lyondell Chemical Company, Channelview Plant will be protective of human health and the environment for as long as the waste remains hazardous. This 2000 HWDIR Exemption Petition Reissuance Request is sufficient to demonstrate to a reasonable degree of certainty that continued waste injection at this facility would be protective of human health and the environment for as long as the waste remains hazardous in accordance with the applicable provisions of the Hazardous and Solid Waste Amendments of 1984 (HSWA). Accordingly, Lyondell Chemical Company requests the EPA determine that continued injection of wastewater under the conditions described in this 2000 HWDIR Exemption Petition Reissuance Request would be protective of human health and the environment for as long as the waste remains hazardous, and publish notice of its determination in the Federal Register in accordance with RCRA subsection 3004(i).